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(54) Title: **SORBENT MATERIAL HAVING A COVALENTLY ATTACHED PERFLUORINATED SURFACE WITH FUNCTIONAL GROUPS**

(57) Abstract: The present invention relates to a sorbent material having a solid support substantially modified with a fluorinated polymer coating which is covalently attached to the support and the fluorinated polymer coating is containing at least one functional group, methods of obtaining the sorbent material, the use of these materials for separation of substances, a chromatographic column or cartridge at least partially filled with the sorbent material of the invention, a membrane-like device comprising the sorbent material of the invention, a device comprising the sorbent material of the invention in loose form as well as a miniaturized device comprising the sorbent material.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/12517

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
RU 2080905	C	10-06-1997	RU 2080905 C1	10-06-1997
WO 0196556	A	20-12-2001	AT 259850 T	15-03-2004
			AU 5381700 A	02-01-2001
			AU 6408401 A	24-12-2001
			CA 2376429 A1	21-12-2000
			DE 60008380 D1	25-03-2004
			EP 1194479 A1	10-04-2002
			WO 0196556 A1	20-12-2001
			JP 2003502465 T	21-01-2003
			US 6573307 B1	03-06-2003
US 5079155	A	07-01-1992	US 4885250 A	05-12-1989
			US 4954444 A	04-09-1990
			CA 1321768 C	31-08-1993
			DE 3884016 D1	21-10-1993
			DE 3884016 T2	20-01-1994
			DK 108588 A	03-09-1988
			EP 0281368 A2	07-09-1988
			IE 63200 B1	05-04-1995
			JP 1791987 C	14-10-1993
			JP 5001714 B	08-01-1993
			JP 63294784 A	01-12-1988
EP 0621074	A	26-10-1994	CA 2121747 A1	23-10-1994
			DE 69419448 D1	19-08-1999
			DE 69419448 T2	30-03-2000
			EP 0621074 A1	26-10-1994
			JP 2871435 B2	17-03-1999
			JP 6308109 A	04-11-1994
			US 5773587 A	30-06-1998
SU 1839325	A	10-11-1995	SU 1839325 A1	10-11-1995
WO 0041807	A	20-07-2000	EP 1020220 A1	19-07-2000
			AT 229842 T	15-01-2003
			AU 2288800 A	01-08-2000
			CA 2360322 A1	20-07-2000
			DE 60001053 D1	30-01-2003
			DE 60001053 T2	25-09-2003
			WO 0041807 A1	20-07-2000
			EP 1148945 A1	31-10-2001
			ES 2188501 T3	01-07-2003
			JP 2002534258 T	15-10-2002
EP 0535376	A	07-04-1993	JP 5060761 A	12-03-1993
			AU 2121492 A	04-03-1993
			CA 2077157 A1	01-03-1993
			EP 0535376 A1	07-04-1993
US 4160728	A	10-07-1979	BE 861589 A1	07-06-1978
			CA 1101827 A1	26-05-1981
			CH 634661 A5	15-02-1983
			DE 2754252 A1	15-06-1978
			DK 544977 A	09-06-1978
			FR 2373316 A1	07-07-1978
			GB 1592885 A	08-07-1981
			IE 45932 B1	29-12-1982

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 03/12517

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4160728	A	IT 1089344 B	18-06-1985
		JP 1010779 B	22-02-1989
		JP 1537302 C	21-12-1989
		JP 53071899 A	26-06-1978
		LU 78658 A1	11-07-1978
		NL 7713517 A	12-06-1978
		SE 442591 B	20-01-1986
		SE 7713892 A	09-06-1978
<hr/>			
US 5522994	A	04-06-1996	NONE
<hr/>			
EP 0648777	A	19-04-1995	US 5438129 A
			DE 69421886 D1
			DE 69421886 T2
			EP 0648777 A1
			JP 2596716 B2
			JP 7184652 A
			US 5625054 A
<hr/>			

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B01J20/32 G01N30/48 B01D15/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ, COMPENDEX, INSPEC, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
Y ✓	DATABASE WPI Section Ch, Week 199807 Derwent Publications Ltd., London, GB; Class A89, AN 1998-075292 XP002277064 & RU 2 080 905 C (BIOORGANIC CHEM INST), 10 June 1997 (1997-06-10) abstract ---	1,2,6-9, 12, 14-18,21
Y ✓	WO 01/96556 A (PROMETIC SCIENCES) 20 December 2001 (2001-12-20) page 4, line 29 - line 33 page 4, line 8 - line 10 page 4, line 19 page 6, line 1 - line 10 page 10; example 9 claim 10 --- -/--	1,2,6-9, 12, 14-18,21

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International Application No

PCT/EP 03/12517

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A ✓	<p>US 5 079 155 A (G.B. COX) 7 January 1992 (1992-01-07) column 4, line 53 - line 56 column 4, line 63 - column 5, line 2 column 5, line 45 - line 50 column 8, line 6 - line 10 column 9, line 7 - line 25 ---</p>	3,22,23
A ✓	<p>EP 0 621 074 A (E.I DU PONT DE NEMOURS AND COMPANY) 26 October 1994 (1994-10-26) column 3, line 14 - line 18 column 7, line 31 - line 50 ---</p>	1,3,6,7, 9,16-18, 20,21
A ✓	<p>DATABASE WPI Section Ch, Week 199627 Derwent Publications Ltd., London, GB; Class A14, AN 1996-267181 XP000222720 & SU 1 839 325 A (BIO-ORG CHEM INST), 10 November 1995 (1995-11-10) abstract ---</p>	1,2,6-8, 12, 15-18,21
A ✓	<p>DATABASE BIOSIS 'Online! BIOSCIENCES INFORMATION SERVICE, PHILADELPHIA, PA, US; November 1998 (1998-11) KAPUSTIN D V ET AL: "Composite fluoropolymer-containing sorbents for isolation and purification of biopolymers" Database accession no. PREV199900110788 XP000217877 abstract & BIOORGANICHESKAYA KHIMIYA, vol. 24, no. 11, November 1998 (1998-11), pages 868-876, ISSN: 0132-3423 ---</p>	1,2, 16-18,21
A ✓	<p>WO 00/41807 A (MIRA DIAGNOSTICA GMBH) 20 July 2000 (2000-07-20) claims 1,2,7-9 & EP 1 148 945 B (NEXTEC) 18 December 2002 (2002-12-18) cited in the application claims 1,2,7-9 ---</p>	1,2,6,7, 16-18, 20,21
A ✓	<p>EP 0 535 376 A (IMMUNOBION LTD) 7 April 1993 (1993-04-07) claims 1,8,9,12 ---</p>	1,11,16, 19
A ✓	<p>US 4 160 728 A (J.J. KIRKLAND) 10 July 1979 (1979-07-10) column 6, line 57 - line 61 column 2, line 42 - line 48 ---</p>	4,5
	-/--	

INTL. NATIONAL SEARCH REPORT

International Application No

PCT/EP 03/12517

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A ✓	US 5 522 994 A (J.M.J. FRECHET) 4 June 1996 (1996-06-04) column 5, line 8 - line 15 column 5, line 57 -----	4,5
A ✓	EP 0 648 777 A (BECTON DICKINSON CO) 19 April 1995 (1995-04-19) -----	